sure the density varies proportionally with the pressure within certain limits, the true constant of refraction should be that function of the index of refraction and of the density which is independent of pressure. In point of fact Prof. Quincke's experiments confirm the formula of Dale and Gladstone, since $\frac{\mu - 1}{s} = \frac{\mu_1 - 1}{s_1}$, where s_1 is the density under any given pressure, and μ_1 the observed refractive index under the same pressure. To put the matter in simple phrase, *the decimals of the refractive index increase proportionately with the density.*

IN a further paper in *Wiedemann's Annalen*, Prof. Quincke has given some details concerning the experimental methods pursued in his investigations, together with figures of the apparatus and tables of results for a large number of liquids under different conditions.

M. BLEEKRODE has lately described in the *Journal de Physique* a very convenient form of apparatus for projecting galvanic experiments on a screen. It consists of a glass bath (6 cm. long, 5 cm. high, 1 cm. broad), at either end of which is a metallic support which not only makes contact with the two plates that are immersed in the bath, but also are attached to a flat galvanometer which is placed on the top of the bath. The galvanometer consists of a light ebonite framework the same size as the top of the bath and 1 cm. thick, upon which is wound two or three layers of insulated copper wire ·3 mm. thick. A single needle is used, supported on a pivot in the centre of the coil. The whole apparatus is of such a size as to be easily used in any lantern.

IN a recent number of *Carl's Repertorium*, Th. Edelmann describes a very simple means of determining the specific weight of a gas. His method consists in taking a column of gas which presses on a membrane, then observing the displacement of the membrane. This is a somewhat analogous action to the aneroid barometer. The absolute arrangement being to have the membrane strained on a metallic box about 30 cm. diameter, this box is in direct communication with a tube 2 m. long filled with gas. Upon the membrane rests a light lever which carries a mirror at its point of suspension; thus by raising a scale at a considerable distance the slightest movements can be observed and therefore the density taken with the greatest accuracy.

M. MORIN has lately brought out a new electric candle, one great advantage in it being that the light may be extinguished or relighted at any time. This is obtained by the attraction of a piece of soft iron by a flattened solenoid; fixed on the same axis as the soft iron is a cam, upon whose position the proximity of the carbon depends. This motion is easier and not so noisy as the electromagnet as used by Wilde and others.

M. TOMMASI has brought out a new regulator in which he uses selenium, whose resistance varies considerably with variations in the intensity of light. At present it has only been adapted to regulating the position of the light of a Jablochkoff candle.

THE latest idea brought out for making incandescent lamps is by Messrs. Boulton, Soward, and Probert. They electrolyse a carbonaceous gas between platinum electrodes, in a globe; as soon as an arch of carbon is formed the globe is exhausted and the lamp ready for use.

MESSRS. J. ELSTER AND H. GEITEL have found that a Zamboni pile can be made to work as an accumulator by charging it from a Holtz machine. After ten minutes they obtained a spark with the poles 1 mm. apart. Peroxide of lead does not work so well when used ready formed.

M. REYNIER has published some figures concerning the work done by a Leclanché battery when used on a telephonic exchange. Two batteries of three cells each were used for thirty days of seven hours' duration. The loss of weight of zinc during that time was 64·5 grms., which represents 63,235 coulombs. This is equal to a current of 0·084 ampere during the month. Taking the E.M.F. of a Leclanché cell at 1 volt, the total work done is 189,705 watts, which is equivalent to 1 h.p. every 52 minutes.

GEOGRAPHICAL NOTES

THE new number (No. 1 of vol. iv.) of the German African Society's *Mittheilungen* gives a table of magnetic observations and temperature made at different points of his route from Kakoma to Karema by Dr. E. Kaiser, who unhappily died last November on the bank of the Rikwa lake. A copious list follows of Dr. Kaiser's altitudes between Zanzibar and Kakoma. On the basis of English maps of the Niger and the Binuë, Dr. Kiepert traces Herr Ed. Robert Flegel's route from Eggan to Bida in September, 1881, and thence by way of Keffi to Loko in November and December of the same year. Summing up Herr Flegel's topographies, Herr Stück determines the latitude of Loko at 7° 58′ 16″ ± 7″ N., and of Keffi at 8° 49′ 22″ ± 3″ N. In an interesting letter from Ngaundere amid the sources of the Logone, dated August 22, 1882, Herr Flegel claims to have discovered the source of the Binuë, or at least an important part of the territory from which this river takes its source. On July 31 last Herr Flegel proceeded from Jola to the watershed between the tributaries of the Faro and the Binuë, and on August 17 reached the first fountain-brook of the Binuë, passing it and two further heads of the river on the 18th. Ascending a steep mountain chain, the watershed between the Binuë, Faro, Logone, and Old Calabar system, he beheld the last stream, by the inhabitants unanimously named the Binuë in contradistinction to the Guzun-Binuë (beginning of the Binuë) he had first passed. From the back of the mountains close by their encampment on the first *rimchi* (farm) of Ngaundere, the source of the Binuë was pointed out by the natives. If not *the* source, it was undoubtedly one of the main sources. After a stay of four months at Ngaundere Herr Flegel returned to Lokoja, whence, in a letter of February 21 last, he projects an early exploration of the lands yet unknown to the south of the Benuë and of the watershed crossed by him the previous year. He also contemplates opening up the territories where the Tsad and the Niger have their sources, and investigating the relations between these two water-systems, examining Barth's hypothesis of a direct water communication between the Tsad and the Niger by means of the Mao Kebbi and the Jubori swamps. He will further make inquiry into the political and ethnographical relations between the Tsad and Niger territories. Astronomical topographies are given of places visited by Lieut. Wissmann between Malange and Kimbundu. There are two interesting and instructive reports by Dr. Pogge and Lieut. Wissmann on their expedition through the south-east of the Congo basin, between Kimbundu and Nge Njangwe, from July 31, 1881, to April 17, 1882. The Kioque, inhabiting the country along the Luelle and the Chikapa, among whom the two travellers journeyed for a month and a half, are described as an intelligent and enterprising people, expert smiths, hunters, and far-travelling merchants. Carrying on a large trade in gum, and soon exhausting a district of its gum produce by their inconsiderate method of going to work, they are in a state of perpetual movement towards the north. Almost all the ivory which reaches Loanda is forwarded thither by the Kioque from the Tuschilange country. The Tuschilange (sing. Kaschilange) or Baschilange (sing. Muschalange) are a mixed people, composed of the aborigines and the Baluba, who have entered the country from the south. Of the three divisions of them the central is the *Bena Riamba, i.e.* sons of wild hemp, so called from their excessive addiction to smoking that herb, which is smoked more or less in almost the whole of Africa, and produces an intoxicating effect combined with coughing. The *Bena Riemba* are forbidden to keep goats or swine, and the travellers during their stay among them suffered from the want of animal food. Crossing the splendid river of Lubi, the travellers passed from the land of the Baschilange to that of the Bassonge, who, according to Lieut. Wissmann, occupy the highest industrial position he had ever seen negroes hold. Artistic working in iron and copper, weaving, basket-making, carving, and pottery are all highly advanced among them. Living in fair villages with large clean houses, under the shade of palms and bananas, the men cultivate their trim fields, and leave only the lighter work to their wives—a relation in marked contrast to that existing among the peoples they had hitherto visited.

THE July number of Hartleben's *Rundschau für Geographie und Statistik* contains, among numerous others, the following original papers:—Researches concerning Madagascar, by J. Audebert.—On the Bedouins of Palestine, by R. Ranipendahl.—On the three first German "Geographentage," by Dr. Sigm. Günther.—On the United States of Columbia; these are remarks accompanying a good map of the States in question.

THE commander of the *Willem Barents*, now on her fifth North Polar expedition, has sent news to Amsterdam from

Solombola. Nothing had been ascertained regarding the fate of the steamer *Varna* or her crew.

AT the meeting of the Berlin Geographical Society on the 8th inst. some communications were made regarding the latest undertakings of the German explorers now at work:—Dr. Paul Güssfeldt had undertaken to ascend the Aconcagua, the highest peak of the Chili Cordilleras (6934 metres); he failed on account of the extreme cold, but succeeded in taking a number of interesting photographs. Dr. Steiner, a member of the Antarctic expedition had proceeded northward from Punta Arenas, and had drawn a remarkable geological map of the country he traversed. He intends to penetrate into Chile. Dr. Hettner is about to start on an exploring tour through Canada with a view of discovering coal deposits.

NEWS of the German African traveller, Dr. Fischer, has just arrived from Zanzibar. He was at some days' distance from Ngaren Erobi, had 800 followers, and had forced his way through the Massai district. He thus seems to have joined other caravans, as he had started with only 350 men himself. Ngaren Erobi is to the west of the Kilima Ngaro, and under 36½° E. long., and 3° S. lat.

LIEUT. BOVE is just starting on a second expedition to Terra del Fuego. Thence he intends to penetrate into Graham's Land. The Italian Geographical Society bears the cost of this expedition, which will sail from Genoa and go by way of Monte Video.

DR. OSCAR LENZ is now writing an account of his second great African journey. It will be published by Brockhaus (Leipzig), and will be entitled "Timbuktu, Reise durch Marokko, die Sahara und den Sudan, ausgeführt im Auftrag der Deutschen Afrikanischen Gesellschaft."

SCIENTIFIC SERIALS

Bulletin de la Société d'Anthropologie de Paris, tome vi. fasc. 1, 1883.—Presidential address.—Conditions to be observed by the competitors for the annual "Godart Prize" of 500 francs, founded in 1862; and for the "Broca Prize" of 1500 francs for the best memoir on a question of human or comparative anatomy, or of physiology referring to anthropology. This prize was founded by Madame Broca in 1881, and is biennial.—Report by M. Pozzi of a highly ornamented so-called medical pipe, found in an ancient mound in Kentucky. This fine specimen of the workmanship of the prehistoric mound-builders of the New World is identical with those found in California, and supposed to have been used for producing blisters and moxas.—M. Ball described the post-mortem appearances of the brain of the Batignolles cretin, whose abnormal condition had been brought to the notice of the Society last year.—On social instinct, by Dr. Prat.—On supposed human imprints found in clay beds at Carson in Nevada, by Dr. W. Hoffman.—An interesting paper on the superstitions and faith in sorcery still persisting in South Italy, by M. Maricourt.—On an anomaly of the brachial biceps, by M. G. Hervé.—On M. Hamy's Case of anthropometric instruments, approved of by the Society, for the use of travellers engaged in Anthropological determinations.—A case of hydrocephalus in a child of ten years, by Dr. de Grandmont, considered specially in reference to the ophthalmic lesions associated with this condition, and their probable joint dependence among other causes on too near relationship between the parents, as intermarriage between first cousins of degenerate constitution.—The reproduction in man of a simian muscle, the scalenus intermedius of the anthropoid apes, by Dr. Testut.—Observations on polyandry in Kouloo and Ladak, by M. Ujfalvy, based on personal investigations during his travels in the Western Himalayas. In Kouloo polyandry and polygamy subsist side by side; in Ladak with similar physical and economic conditions, polygamy, which necessitates a certain degree of material prosperity, is less frequent. The prevalence of polyandry among savage tribes in ancient times, and the organisation of matriarchy, or maternal supremacy, in tribal and domestic rule, were considered by M. Rousselet in the discussion which followed the reading of M. Ujfalvy's important communication.—A discussion on the anthropological study of the crania of great criminals, chiefly in reference to the connection of criminality with any fixed cranial malformation, by M. Manouvrier.—Considerations of the nature of the arterial sulci of the encephalon in man, by M. Danilo.—On the development of the human skeleton, by M. de Merjkowsky, with special reference to the embryological affinities between the higher and lower animals, the author believing that in the human fœtus we have a reproduction of a simian form, which gives support to the theory of development as applied to man.—An anomalous formation of the first rib, by M. G. Hervé.—On the brain of an insane person, by M. Rey, in which the frontal and antero-posterior circumvolutions were extraordinarily developed, together with an excessive weight of the brain.—On a successful attempt to inoculate a monkey with matter taken from an indurated chancre, by M. Pozzi.—On the substance used by the North American Indians to poison their arrows, by Dr. Hoffman.

SOCIETIES AND ACADEMIES

LONDON

Geological Society, June 20.—J. W. Hulke, F.R.S., president, in the chair.—Henry Yorke Lyell Brown, Edward St. F. Moore, John Henry Nichols, and Henry Parker, were elected Fellows, and Baron F. von Richthofen, of Berlin, a foreign correspondent of the Society.—The following communications were read:—On the discovery of *Ovibos moschatus* in the forest bed, and its range in space and time, by Prof. W. Boyd Dawkins, F.R.S. The specimen described by the author formed part of the collection of the late Rev. F. Buxton, and was obtained by a fisherman from the forest-bed of Trimingham, four miles from Cromer. The edges are sharp, and the red matrix adhered in places, so that the author regards its geological position as satisfactorily established. It is the posterior half of the upper surface of the skull of an adult female *Ovibos moschatus*. The author describes the range in space and time of this animal, mentioning the different instances in which its remains have been found in Britain. These are, in some cases, undoubtedly post-glacial; but he inclines to consider the lower brick-earth of the Thames Valley, where the musk-sheep has been found at Crayford, as anterior to the boulder clay, which occupies the district to the north. This deposit at Trimingham, however, is certainly pre-glacial, and so *Ovibos moschatus* belongs to a fauna which arrived in our country prior to the extreme refrigeration of climate which characterised the glacial epoch, and afterwards retreated northwards to its present haunts, showing, with other evidence, that this epoch did not form a hard and fast barrier between two faunas.—On the relative age of some valleys in Lincolnshire, by A. J. Jukes-Browne, B.A.—On the section at Hordwell cliffs, from the top of the Lower Headon to the base of the Upper Bagshot Sands, by the late E. B. Tawney, M.A., and H. Keeping, of the Woodwardian Museum. Communicated by the Rev. Osmond Fisher, M.A. The authors, after a brief sketch of the literature of the subject and of the method which they have adopted in measuring the beds in the Hordwell section, passed on to describe these, viz. the freshwater Lower Headon series, and the so-called Upper Bagshot Sands of the Geological Survey. They make the whole thickness of the former 83½ feet. The bed numbered thirty-two in their section they identified with the Howledge limestone on the other side of the Solent. It is almost the highest seen in the section, and underlies the true Middle Headon which is now no longer exposed. The authors pointed out that in their opinion the late Marchioness of Hastings and Dr. Wright have somewhat misapprehended the position of these several beds. Details were then given of the remainder of the section, and comparisons made with the details published by former authors; after which the authors described the underlying estuarine series, or Upper Bagshot Sands, which has a thickness of 17½ feet.—On some new or imperfectly known Madreporaria from the Coral Rag and Portland Oolite of the counties of Wilts, Oxford, Cambridge, and York, by R. F. Tomes, F.G.S.—The geology of Monte Somma and Vesuvius, being a study in vulcanology, by H. J. Johnston-Lavis, F.G.S. The author, after referring to the vast amount of literature which has appeared dealing with the same subject, stated that his object was to lay before the Society the results of his personal observations. The external form and general features of Monte Somma having been described, the origin of the present condition of the volcano was discussed in some detail, and the geological structure of the mountain and of the surrounding plain, as revealed by well-sections, was carefully considered. As the result of his observations the author believes that he is able to define eight successive phases in the history of the volcano; and the events which took place during these several periods, with the products of the eruption during each, were